UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

OCT 30 1985

Docket No. 50-461

APPLICANT: Illinois Power Company

FACILITY: Clinton Power Company

SUBJECT: SUMMARY OF FOLLOW UP MEETING WITH ILLINOIS POWER COMPANY RELATED TO THE PUMP AND VALVE OPERABILITY RECOVERY PROGRAM

A meeting with Illinois Power Company (IP) and Sargent and Lundy (S&L) was held with the NRC staff and its consultant BNL on October 21, 1985, in Bethesda, Maryland. The purpose of the meeting was to demonstrate the following:

- That the IP Pump and Valve Operability Program is in compliance with NRC regulatory guidance.
- The program is being conducted properly.
- To ensure that there was a clear understanding of what was required by IP to successfully complete the Pump and Valve Operability (PVORT) audit.

This meeting was held as a follow up to a meeting held on September 26, 1985, to provide assurance to the staff of the acceptability of the IP recovery program. Plans for a recovery program and re-audit were initiated because the results of the staff PVORT audit held the week of August 26, 1985 were determined to be unacceptable. A list of the meeting attendee's is contained in Enclosure 1 and copies of VU-graphs used by IP and S&L during their presentation is contained in Enclosure 2.

Key points made by IP during their presentation were:

- The IP Pump and Valve Operability Program meets the NRC regulatory requirements. Stone & Webster was engaged to conduct an audit of the Sargent & Lundy program and found it adequate.
- All pumps or valves in the program were covered by tests or analysis or both.
- A large representative sample of valves was tested and comparisons of the results of the analyses with the test results demonstrated that the analyses were conservative.
- The method of determining operability was demonstrated for one of the suction isolation valves in the Reactor Core Isolation (RCIC) system.

- IP wanted a clear understanding of what was expected for the November PVORT audit.

- IP wanted to receive staff confirmation that the approach for conducting the Pump and Valve Operability Program was acceptable.

At the end of the meeting the staff concluded:

- The staff had no major concerns related to the IP Pump and Valve Operability Program based on the information presented during the re-audit meeting.

- The staff will proceed with a re-audit of the IP PVORT. The week of November 18, 1985 for the audit was mutually agreed upon.

- All packages to be reviewed by the staff prior to the audit must be submitted to the staff by November 8, 1985.

- The responses to the 30 audit items from the initial audit should be submitted by November 4, 1985.

- The re-audit components would be selected from those remaining from the August audit plus ten new components which were provided to IP on October 25, 1985. In addition two "surprise" components will be given to IP a few days prior to the audit.

B. Siegel

B. Siegel, Project Manager
Licensing Branch No. 2
Division of Licensing

Enclosures:
As stated

cc: See next page

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Enclosure 1

Illinois Power/NRC Staff Meeting

PUMP AND VALVE OPERABILITY PROGRAM

Monday, October 21, 1985

Name	Organization
R. E. Wadlington	Sargent & Lundy
P. J. Telthorst	Illinois Power
J. S. Perry	Illinois Power
F. A. Spangenberg	Illinois Power
R. J. Bosnak	NRC/DE
G. Bagchi	NRC/DE/EQB
R. Bernero	NRC/DSI
D. C. Shelton	IPC
J. F. Carbonaro	BNL
B. E. Miller	BNL
J. Lombardo	NRC/DE/EQB
B. Siegel	NRR/DL/LB#2
Arnold Lee	NRR/DE/EQB
M. J. Shewski	S&L
R. M. McCaucey	S&L
Ismail T. Kisisel	S&L
W. F. Emerson	SWEC
Frank Sestak, Jr.	SWEC
J. M. Gwinn	SWEC
R. M. Tjernlund	S&L
W. R. Butler	NRR/DL/LB#2
V. R. Harris	IP
C. T. Gentile	IP
R. L. Huston	IP
R. C. Heider	S&L
R. M. Sroka	S&L

CLINTON POWER STATION

- **CONSTRUCTION PERMIT**

  DOCKETED FOR REVIEW 10/31/73

  ISSUED 2/24/76

- **OPERATING LICENSE**

  DOCKETED FOR REVIEW 9/8/80

Enclosure 2

CPS FINAL SAFETY ANALYSIS REPORT

- APPLICABLE SECTIONS
- ACTIVE EQUIPMENT

ACCEPTANCE CRITERIA

- OL DOCKETED — NUREG 75/087
- CURRENT — NUREG 0800

CPS COMPLIANCE

- IN EFFECT WHEN OL ISSUED
- GENERAL DESIGN CRITERIA
- REGULATORY GUIDES
- IEEE STANDARDS

CPS COMPLIANCE

- EXCEEDS NUREG 75/087
- MEETS NUREG 0800

CLINTON POWER STATION
NUREG - 0800 REVISION 5
SECTION 3.10 II IA QUALIFICATION FOR EQUIPMENT OPERABILITY

ITEM	STANDARD REVIEW PLAN POSITION	CLINTON POSITION
1.	QUALIFICATION MUST CONSIDER • OBE & SSE • NORMAL CONDITION LOADS • TRANSIENT & ACCIDENT CONDITION LOADS	QUALIFICATION CONSIDERS • OBE & SSE • NORMAL OPERATING LOADS • TRANSIENT PIPING NOZZLE REACTIONS & VALVE ACCELERATIONS • POOL HYDRODYNAMIC (SRV & LOCA) LOADS
	TEST AND ANALYSIS REQUIRED TO CONFIRM OPERABILITY. ANALYSIS ALONE ACCEPTABLE ONLY IF OPERABILITY ASSURED BY STRUCTURAL INTEGRITY.	COMPLEX ITEMS QUALIFIED BY TEST. STRUCTURALLY SIMPLE ITEMS QUALIFIED BY ANALYSIS.
2.	TEST IN OPERATIONAL CONDITION WITH OPERABILITY VERIFIED DURING AND/OR AFTER TESTING.	TESTING DONE IN OPERATIONAL CONDITION WITH OPERABILITY VERIFIED DURING AND AFTER TESTING.
	TESTING SHOULD SIMULATE NORMAL PLANT OPERATING LOADS AND DEGRADED FLOW CONDITIONS TO EXTENT PRACTICAL	NOT PRACTICAL FOR SEISMIC TEST TO SIMULATE: • FULL/DEGRADED FLOW CONDITIONS • THERMAL EFFECTS • PIPING NOZZLE REACTIONS ANALYSIS USED TO SUPPLEMENT TESTING.

ITEM	STANDARD REVIEW PLAN POSITION	CLINTON POSITION
3.	DYNAMIC INPUT DEFINED AS RESPONSE SPECTRA OR TIME HISTORY AT EQUIPMENT MOUNTING LOCATION	DYNAMIC INPUT DEFINED AS: • FLOOR RESPONSE SPECTRA FOR PUMPS • SEISMIC COEFFICIENTS FOR VALVES (DERIVED FROM PIPING ANALYSIS FOR WHICH INPUT IS DEFINED AS RESPONSE SPECTRA)
4.	TEST INPUT MUST ENVELOPE REQUIRED INPUT WITH DEMONSTRATED CONSERVATISM	TEST INPUT ENVELOPES REQUIRED INPUT WITH CONSERVATISM
5.	MULTI-FREQUENCY INPUT PREFERRED, SINGLE FREQUENCY INPUT ACCEPTABLE IF JUSTIFIED	MULTI-FREQUENCY INPUT USED WITH FEW EXCEPTIONS, EXCEPTIONS JUSTIFIED
6.	TESTING SHOULD BE BI-AXIAL SINGLE AXIS TESTING ACCEPTABLE ONLY IF JUSTIFIED	TRI-AXIAL & BI-AXIAL TESTING USED WITH FEW EXCEPTIONS, EXCEPTIONS JUSTIFIED
7.	DYNAMIC COUPLING BETWEEN EQUIPMENT AND RELATED SYSTEMS (I.E. PIPING OTHER MECH. COMPONENTS) SHOULD BE CONSIDERED	QUALIFICATION CONSIDERS INTERFACING STRUCTURES AND SYSTEMS
8.	TEST FIXTURE MUST SIMULATE ACTUAL SERVICE MOUNTING AND SHOULD NOT CAUSE EXTRANEOUS DYNAMIC COUPLING.	TEST MOUNTING SIMULATES SERVICE MOUNTING AND FIXTURES, IF USED, DO NOT AMPLIFY OR ATTENUATE INPUT.

ITEM	STANDARD REVIEW PLAN	CLINTON POSITION
9.	FOR PUMPS AND VALVES, LOADS IMPOSED BY ATTACHED PIPING SHOULD BE PROPERLY TAKEN INTO ACCOUNT, STRESSES SHOULD ENVELOPE SPECIFIED SERVICE LIMITS	PIPING NOZZLE REACTIONS CONSIDERED. STRESSES SATISFY SPECIFICATION ALLOWABLES.
10.	IF DYNAMIC TESTING OF VALVE OR PUMP IS IMPRACTICAL, STATIC TESTING IS ACCEPTABLE PROVIDED: ° END LOADINGS CONSERVATIVELY APPLIED ° AMPLIFICATION EFFECTS ACCOUNTED FOR ° EQUIPT. IN OPERATING MODE DURING AND AFTER APPLICATION OF LOADS ° VALIDITY OF STATUS LOAD APPLICATION DEMONSTRATED	STATIC TESTING NOT USED TO DEMONSTRATE QUALIFICATION. STATIC TESTING USED TO SUBSTANTIATE AND SUPPLEMENT ANALYSIS.
11.	IN-SITU VIBRATORY TESTING OF COMPLEX ACTIVE DEVICES ACCEPTABLE TO DEMONSTRATE OPERABILITY PROVIDED TEST CAN BE SHOWN TO BE MEANINGFUL	IN-SITU TESTING NOT USED TO DEMONSTRATE QUALIFICATION. IN-SITU TESTING USED TO SUBSTANTIATE ANALYTICAL MODELS.
12.	TEST PROGRAM MAY BE BASED UPON SELECTIVELY TESTING A REPRESENTATIVE SAMPLE	REPRESENTATIVE SAMPLES TESTED.

ITEM	STANDARD REVIEW PLAN POSITION	CLINTON POSITION
13.	DAMPING VALUES IN ACCORDANCE WITH REG. GUIDE 1.61	DAMPING VALUES MORE CONSERVATIVE THAN REG. GUIDE 1.61
14.	WHEN COMPLETE TESTING NOT PRACTICAL, FOLLOWING FEATURES SHOULD BE INCORPORATED IN PUMP/VALVE OPERABILITY ASSURANCE PROGRAM:	
	A. SIMPLE AND PASSIVE ELEMENTS SUCH AS: ° VALVE BODIES ° PUMP BODIES ° RELATED PIPING ° SUPPORTS MAY BE ANALYZED	VALVE BODIES, PUMP BODIES, AND PUMP MOTORS QUALIFIED BY ANALYSIS WITH REPRESENTATIVE VALVE ASSEMBLIES TESTED.
	COMPLEX ACTIVE ITEMS SUCH AS: ° PUMP MOTORS ° VALVE OPERATORS ° GATE & DISC ASSEMBLIES ° VITAL APPURTENANCES SHOULD BE TESTED FOR OPERABILITY	VALVE ACTUATORS, PILOT SOLENOID VALVES, POSITION SWITCHES, AND PUMP TURBINE QUALIFIED BY TEST.

ITEM	STANDARD REVIEW PLAN POSITION	CLINTON POSITION
14.	(CONTINUED)	
	B. WHEN CORRELATED TO CLASSICAL PROBLEMS, LABORATORY TESTS OR IN-SITU TESTS. ANALYSES TO DETERMINE THE FOLLOWING ARE ACCEPTABLE: I) VIBRATORY INPUT II) SYSTEM FREQUENCIES AND MOVEMENTS III) VERIFY DISC LOADS AND ADEQUACY IV) LOADS IMPOSED UPON PUMP ROTOR V) PUMP SHAFT SPEED VI) DESIGN ADEQUACY OF PUMP AND VALVE PRESSURE RETAINING BODIES. VII) PUMP SHAFT NATURAL FREQUENCIES STATIC DEFLECTION ANALYSIS ACCEPTABLE WHERE SHAFT FREQUENCIES ARE BEYOND EXCITATION FREQUENCIES OTHERWISE DYNAMIC ANALYSIS REQUIRED.	ANALYTICAL MODELS AND METHODOLOGY SUBSTANTIATED BY: ° IN-SITU TESTING ° MULTI-FREQUENCY, BIAXIAL OR TRIAXIAL DYNAMIC TESTING ° STATIC PULL TESTING
	VIII) COMBINATION OF MULTI-MODE AND MULTI-DIRECTIONAL RESPONSES SHOULD FOLLOW REG. GUIDE 1.92 GUIDE-LINES	ANALYSIS PERFORMED IN ACCORDANCE WITH NRC 1.92, 1.100 REG. GUIDES.

1E51-F063 OUTLINE

I. GENERAL VALVE SUMMARY

II. SYSTEM DESCRIPTION:

- SYSTEM DIAGRAM
- VALVE CLOSURE REQUIREMENTS
- PIPING CONFIGURATION

III. OPERABILITY DEMONSTRATED BY:

- IN-SHOP TESTS
- ENVIRONMENTAL QUALIFICATION (EQ)
- SEISMIC QUALIFICATION (SQRT)
- POST-INSTALLATION TESTS

CONTAINMENT ISOLATION VALVE 1E51-F063 - GENERAL DATA

VALVE: 1E51-F063

ASME SECTION III, CLASS 1,
1974 EDITION WITH SUMMER 1975 ADDENDA

PURCHASE SPECIFICATION:: K-28664

VALVE PURCHASED IN 1976

8 INCH - 600 LB.

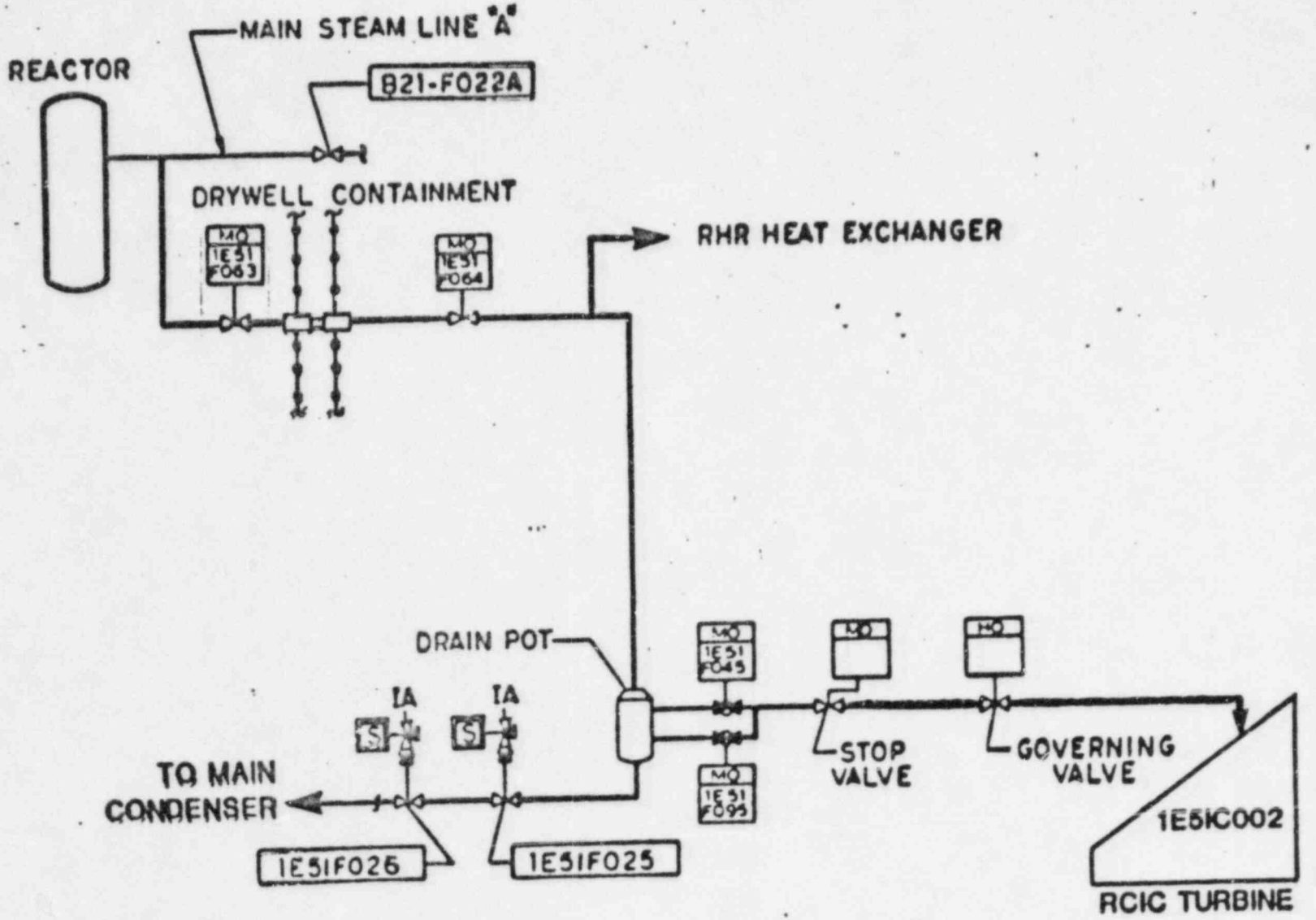
BUTT WELD ENDS

VALVE MATERIAL: CARBON STEEL

VALVE LOCATION: INSIDE DRYWELL

FLUID: REACTOR STEAM

VALVE TYPE & OPERATOR: FLEX WEDGE GATE VALVE WITH
SMB-0 LIMITORQUE MOTOR OPERATOR



STEAM SUPPLY TO RCIC TURBINE

VALVE 1E51-F063 CLOSURE REQUIREMENTS

VALVE POSITION:

- NORMAL: OPEN
- SHUTDOWN: OPEN
- POST-LOCA: OPEN/CLOSED

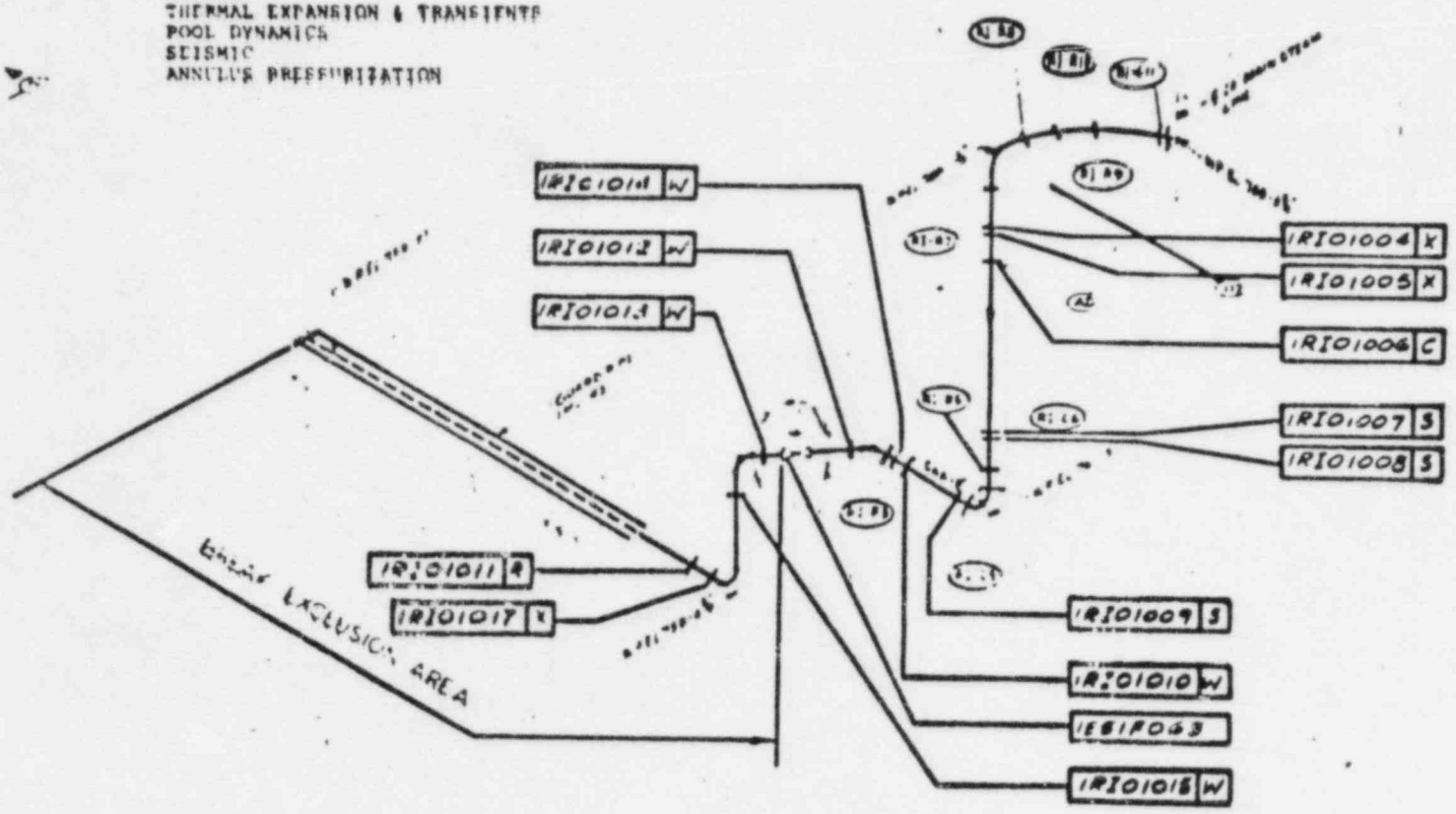
CLOSURE TIME: 33 SECONDS - ESTABLISHED BY NSSS SUPPLIER (GE)

CONTAINMENT ISOLATION SIGNALS:

- HIGH TEMPERATURE SIGNALS ASSOCIATED WITH PIPE RUPTURE OUTSIDE CONTAINMENT
- LOW STEAM LINE PRESSURE
- HIGH STEAM FLOW RATE
- HIGH TURBINE EXHAUST PRESSURE

LOAD COMBINATIONS:

PRESSURE
WEIGHT
THERMAL EXPANSION & TRANSIENTS
POOL DYNAMICS
SEISMIC
ANNULUS PRESSURIZATION



PIPE RUPTURE STRESS AT VALVE 1E51-F063	*ALLOWABLE STRESS AT VALVE 1E51-F063
16386 psi	38925 psi

*SECTION B.1.b. (1) (d) OF MEB 3.1 ATTACHED TO SRP 3.6.2 DATED 1975

LEGEND

POSTULATED PIPE BREAKS

GAPPED PIPE WHIP RESTRAINTS

PIPING SUPPORTS

CLINTON POWER STATION
FINAL SAFETY ANALYSIS REPORT

FIGURE 3.6.C-17

LOCATION OF POSTULATED BREAKS AND ASSOCIATED RESTRAINTS REACTOR CORE ISOLATION COOLING PIPING SYSTEM INSIDE CONTAINMENT

VALVE 1E51-F063 PUMP & VALVE OPERABILITY REVIEW

PVORT PROGRAM

EQ PROGRAM

CYCLIC TESTS

THERMAL AND RADIATION TESTS FOLLOWED BY A FUNCTIONAL TEST

OPERATED DURING AND AFTER LOCA TEST

FUNCTIONAL TEST AFTER THE LOCA TEST

IN-SHOP TESTS

QUALIFICATION TESTS AND ANALYSIS

EQ RESULTS

SQ RESULTS

POST-INSTALLATION TESTS

SQRT PROGRAM

STRESS EVALUATION UNDER DIFFERENT SEISMIC CONDITIONS AT CRITICAL LOCATIONS*

CALCULATED DEFLECTION AT CRITICAL LOCATION*

SHAKE TABLE TESTING OF OPERATOR

*ANALYTICAL METHODS COMPARED VS. TEST RESULTS

IN-SHOP TESTS

- SHELL & DISC HYDROSTATIC TEST
- PACKING LEAK TEST
- MAIN & BACK SEAT LEAKAGE TEST
- OPERATING CYCLE TIME TEST
- MOTOR ROUTINE TEST

Date _____

Page 1 of 2

GATE VALVE TEST DATA REPORT

A/DV Serial No. E6214-5-1

Customer Tag No. 151-F063

Valve Description 8"-600-FW

I. HYDROSTATIC SHELL TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
2250	2260	10	10	0	0
Performed by: Fw. Welch			Date 11/30/78		

II. PACKING TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
2250	2250	4	4	0	0
Performed by: Fw. Welch			Date 11/30/78		

III. BACKSEAT TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
2250	2250	10	10	0	0
Performed by: Fw. Welch			Date 11/30/78		

IV. HYDROSTATIC DISC TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
1500	1500	A-Port 1	1	0	0
		B-Port 1	1	0	0
Performed by: Fw. Welch			Date 11/30/78		

GATE VALVE TEST DATA REPORT

W. SEAT TEST

Pressure - psig		Duration - min.		Leakage - cc/hr.	
Required	Actual	Min. Required	Actual	Max. Allowed	Actual
1500	1500	A-Port	1	80	24
		B-Port	1	80	60
Performed by: J.W. Mark				Date 11/30/78	

WI. OPERATIONAL TEST

Open				Close			
Pressure - psig		Time - min.		Pressure - psig		Time - min.	
Required	Actual	Required	Actual	Required	Actual	Required	Actual
1150	1150	33sec	26	1150	1150	33sec	26
Performed by: J.W. Mark				Date 11/30/78			

VII. COMPONENT HEAT OR SERIAL NUMBER

Body F786 3/4 R3601 Stem 16426 K5

Bonnet 46630 3/4 1 Motor 713190-4C

Disc A1420 3/4 R1945 Operator 260552

Body/Bonnet Bolting n/a

Nuts n/a Retaining Ring 5437646

VIII. TORQUE SWITCH SETTING

Open 2 3/4

Close 2 3/4

IX. LIMIT SWITCHES SET (yes or no)

Open yes

Close yes

Operability Testing and Analysis Applicable to Valve 1E51-F063

	Valve Body Alone	Operator Alone	Valve and Operator Assembly
In-Shop Testing			
Shell hydrostatic test			Test
Disc hydrostatic test			Test
Packing leak test			Test
Main seat leak test			Test
Back seat leak test			Test
Operating test			Test
Motor routine test		Test	
Motor performance test curve		Test	
Qualification Testing and Analysis			
Electrical environmental:			
Aging simulation		Test	
Mechanical aging		Test	
Radiation aging		Test	
Operation (during and after)		Test	
Pressure/temperature profile		Test	
Operational test (during and after)		Test	
Mechanical environmental:			
Material degradation	Analysis		
Seismic:			
Stress evaluation	Analysis	Test	Analysis
Stem deflection	Analysis		Analysis
Postinstallation Testing			
Seat leak detection			Test
Low-voltage circuit check		Test	
Circuit breaker/overload relay		Test	
Megger test		Test	
Local leak rate test			Test
Startup tests			Test

Electrical Design Process To Ensure Adequate Voltage at MOV

Valve specification voltage range (K-2866A)

- 460 volts ± 10%

ESC-165: Auxiliary System Design Guide

- 90% of 480 volts at 480-volt unit substations
  (i.e., 94% of 460 volts under expected worst probable case conditions)

Calculation 4536-EAD-1

- Calculation of auxiliary system voltage levels under normal and emergency (LOCA) conditions
- Updated as project progressed
- No 480-volt bus voltage less than 90% of 480 volts or 94% of 460 volts

Calculation 19-AQ-2

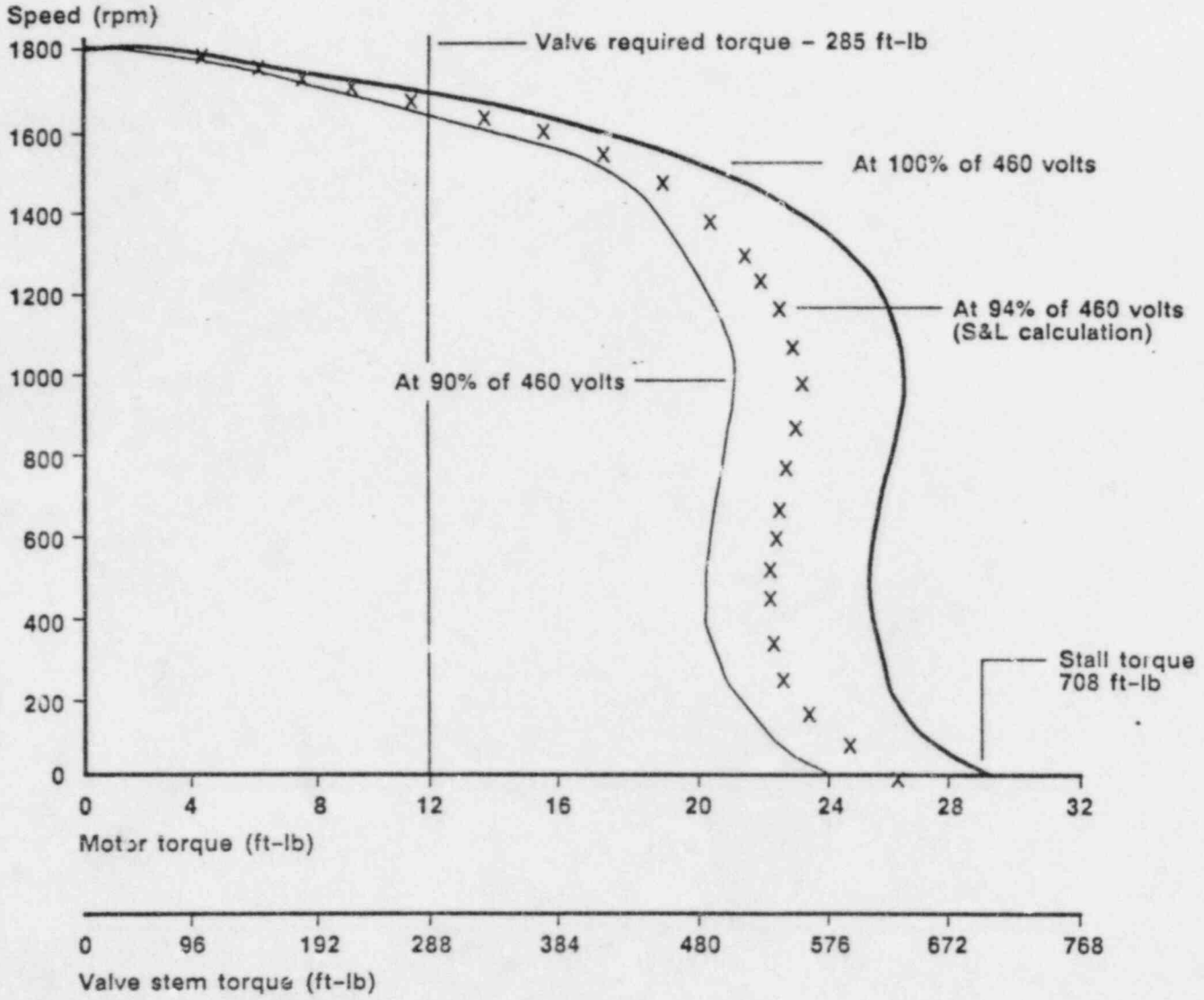
- Voltage required at MCC 1B3 to provide at least 90% of 460 volts at MOV E51-F063 when stalled is 91% of 460 volts
- Minimum voltage at MCC 1B3 from calculations 4536-EAD-1 and 19-AQ-2 is 95% of 460 volts

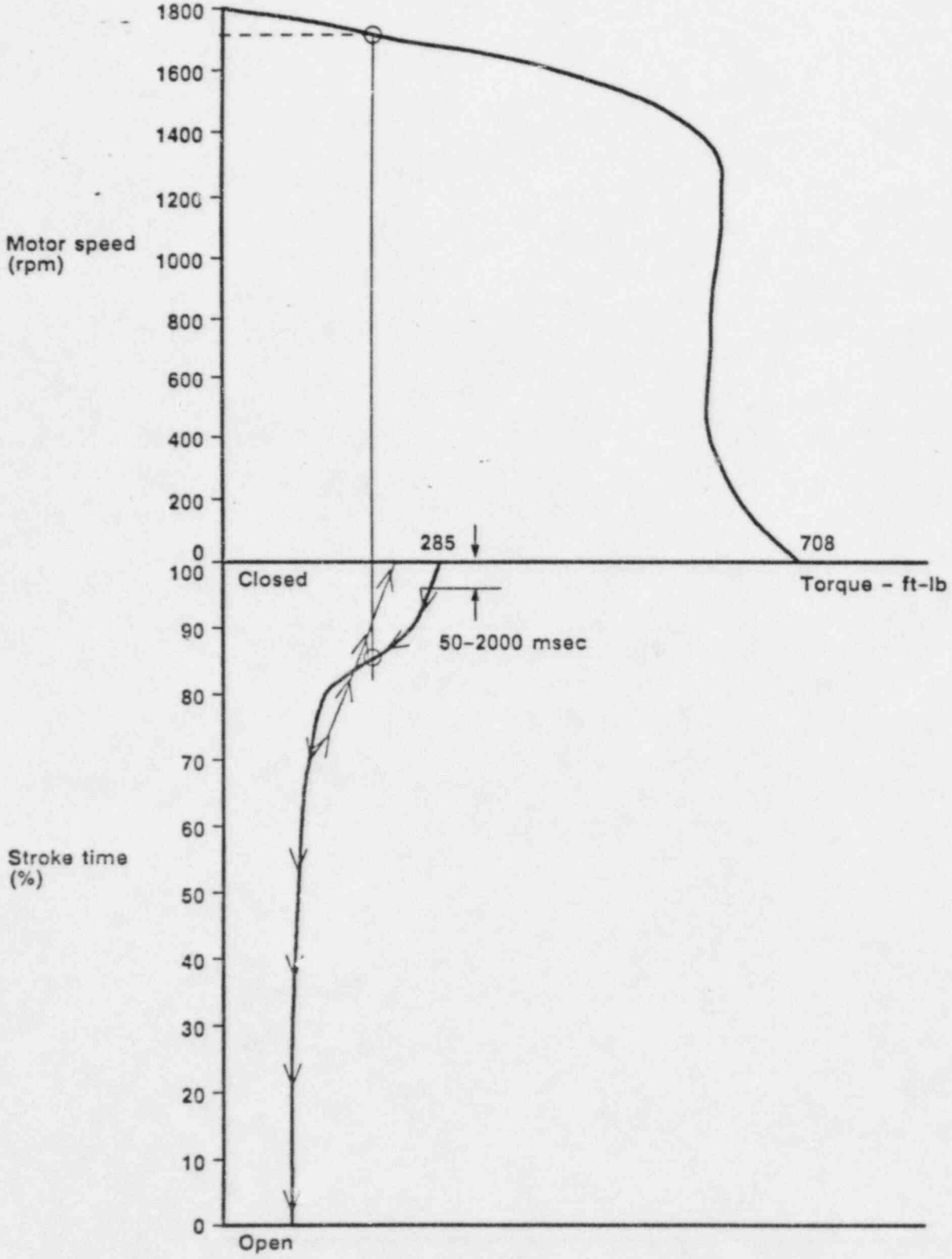
Voltage Percentages of 460 Volts

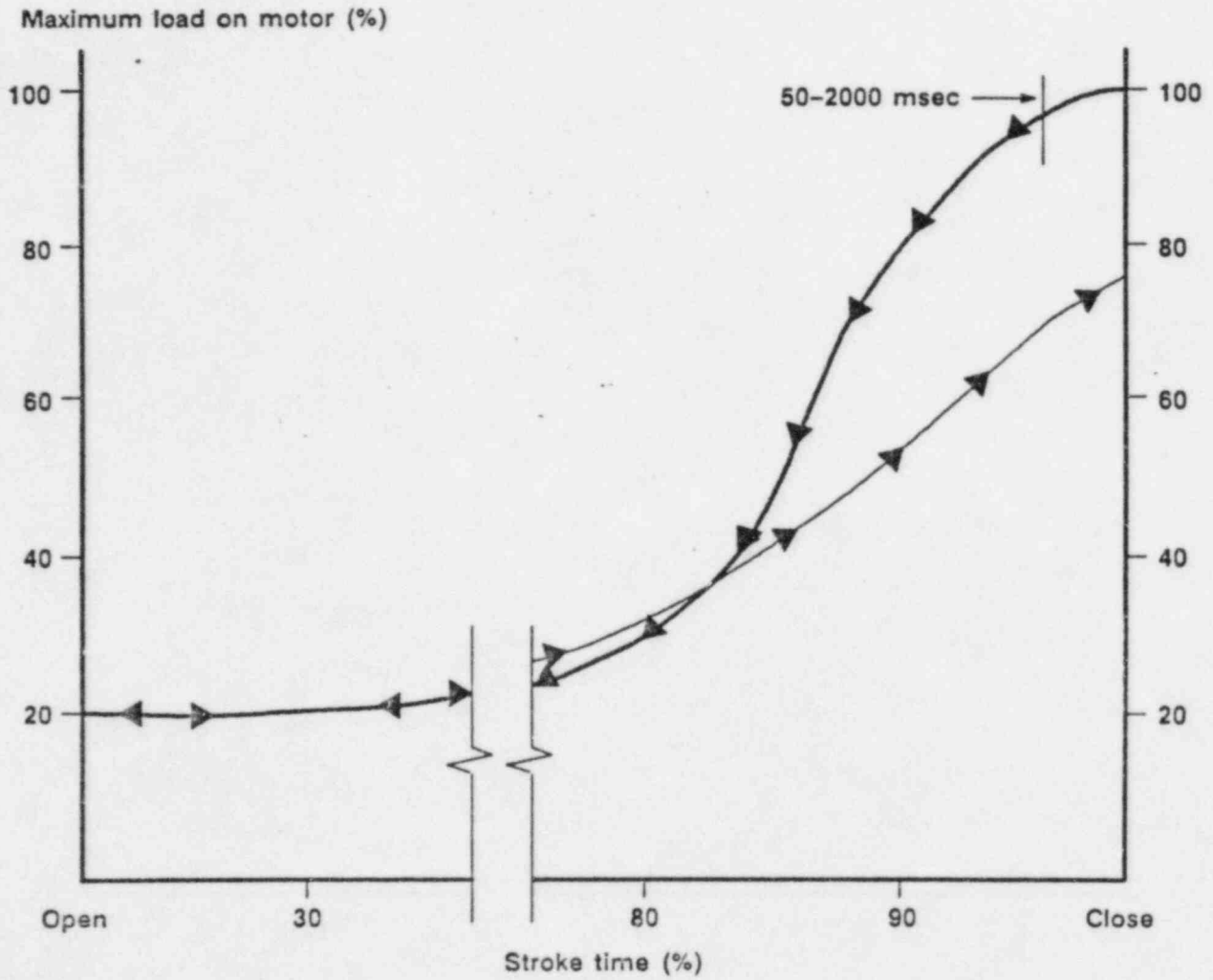
Division 2	Minimum Allowable Voltage	S&L Calculated Voltage
480-volt Bus 1B	91.4%	95.4%
Cable		
480-volt MCC 1B3	91%	95%
Cable		
MOV	90%	94%
1E51-F063		

Motor Torque vs. Speed at 90%, 94%, and 100% of 460 Volts

460-volt actuator motor for valve E51-F063




1800
1600
1400
1200
1000
800
600
400
200
0
Motor speed (rpm)
285
708
Closed
Torque - ft-lb
50-2000 msec
100
90
80
70
60
50
40
30
20
10
0
Stroke time (%)
Open


Maximum load on motor (%)
100
80
60
40
20
50–2000 msec
100
80
60
40
20
Open
30
80
90
Close
Stroke time (%)

EQ Program

Requirements: FSAR Tables 3.11-5/3.11-6
Zone: H27

	Conditions	
	Plant Requirement	**Tested**
Radiation	2×10^8 rads TID	2.04×10^8 rads TID
Thermal	40 years	40 years
Humidity	100% RH (S.S.)	100% RH (S.S.)
Pressure	30 psig (peak)	105 psig (peak)
Accident temperature	330° F (peak)	340° F (peak)
Accident duration	100 days	30 days; actual test extrapolated to 110 days (10% mar.)

Operator: SMB-0
Qualified by testing SMB-0
Test report: Limitorque B0058
(Specific-BWR Cont Q.R. #600376A)

Valve: Qualified by material degradation analysis

EQ Program

Conclusions – for operator and valve

- No age-limited materials were identified having less than 40 years
- Operability was verified

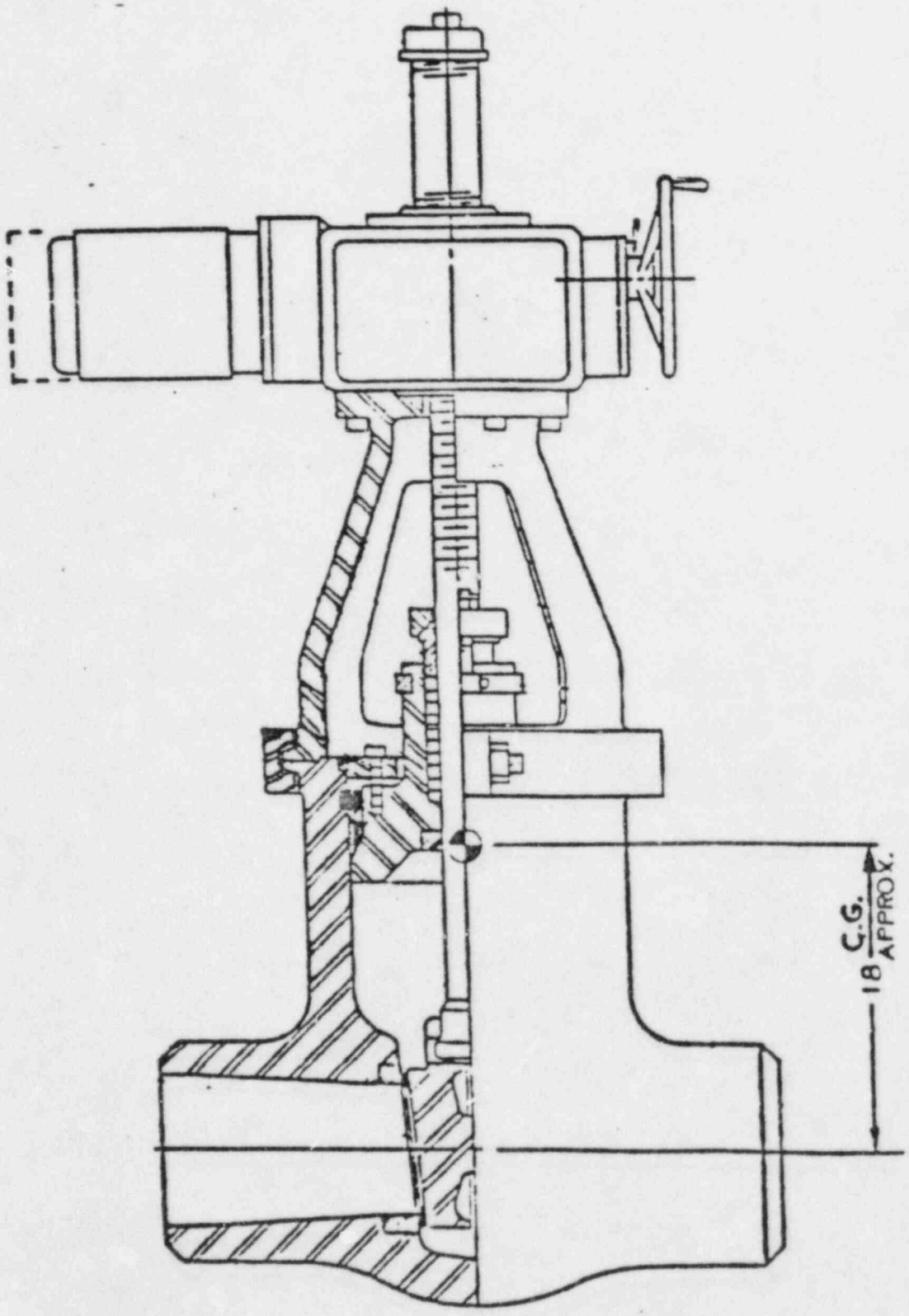
1E51-F063 Qualification Analysis and Test

Operator

- Operability demonstrated by test

Valve assembly (operator and valve body)

- Operability demonstrated by analysis
- Analysis method confirmed by test


18 C.G. APPROX.

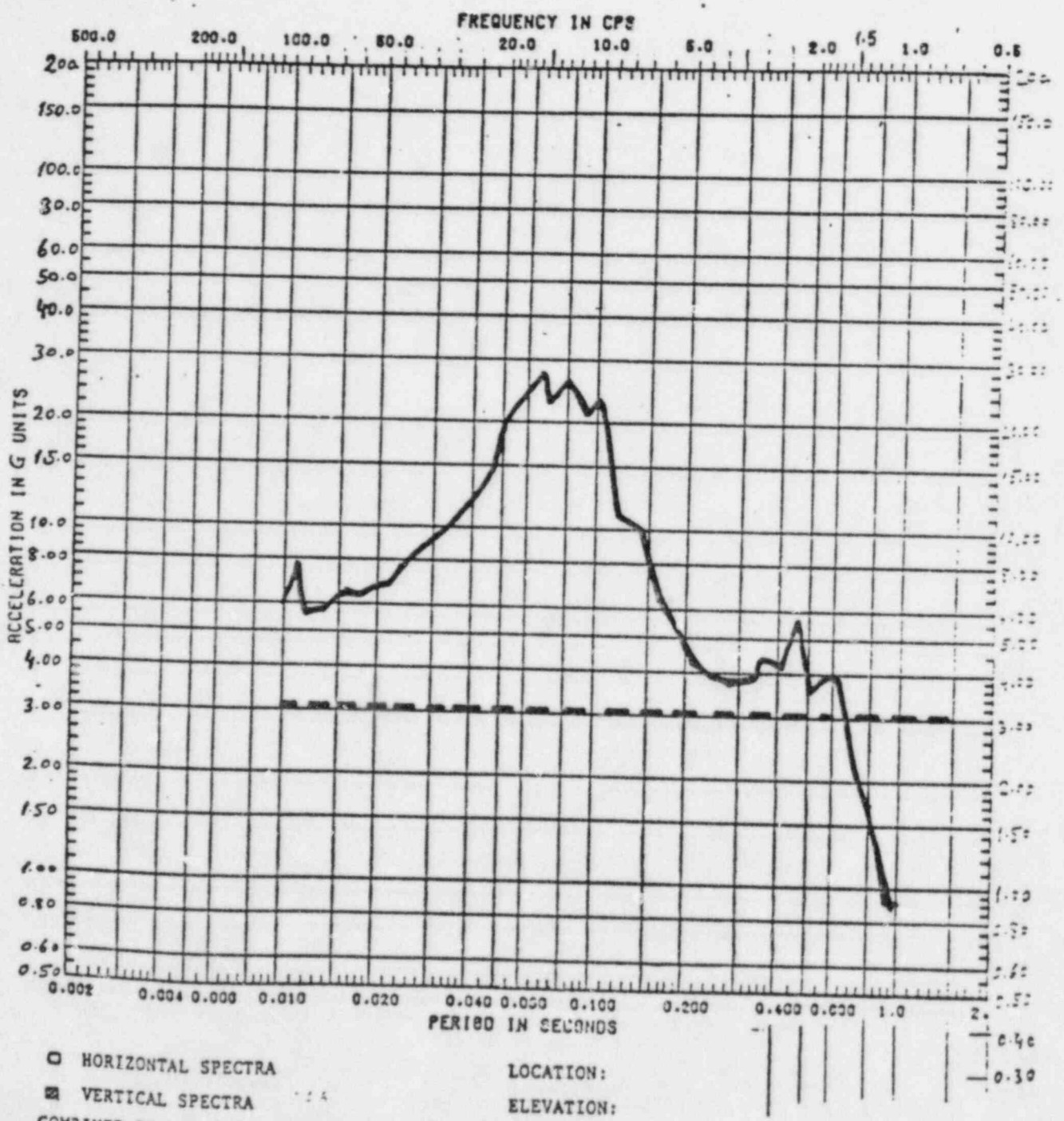
Seismic Qualification of Limitorque Valve Operator SMB-0

- Qualified by testing (SQ-CL 120)
- SMB-000-2 model tested as representative sample of generic family of operators constructed of similar metals, designed to same concepts, tolerances, and stress levels
- Triaxial test method was used
- Test sequence
  - SRV fatigue tests
  - SRV and chugging tests
  - OBE tests (Level B)
  - SSE tests (Level C)
  - Fragility tests to table limits
- Operability was verified before, during, and after each test
- Voltage was varied ±10% during seismic tests and operator was cycled under load
- Chatter at limit switch contacts was monitored
- No anomalies regarding qualification were reported

SARGENT & LUNDY ENGINEERS CHICAGO

Calcs. For		Calc. No.
		Rev. / Date
Safety-Related / Non-Safety-Related		Page / of

Client	Prepared by	Date
Project	Reviewed by	Date
Proj. No. / Equip No.	Approved by	Date



☐ HORIZONTAL SPECTRA

☒ VERTICAL SPECTRA

COMBINED BY ☐ ABS ☐ SRSS

LOCATION:

ELEVATION:

DAMPING:

SARGENT & LUNDY ENGINEERS CHICAGO

Calcs. For		Calc. No.
		Rev. / Date
Safety-Related / Non-Safety-Related		Page of

Client	Prepared by	Date
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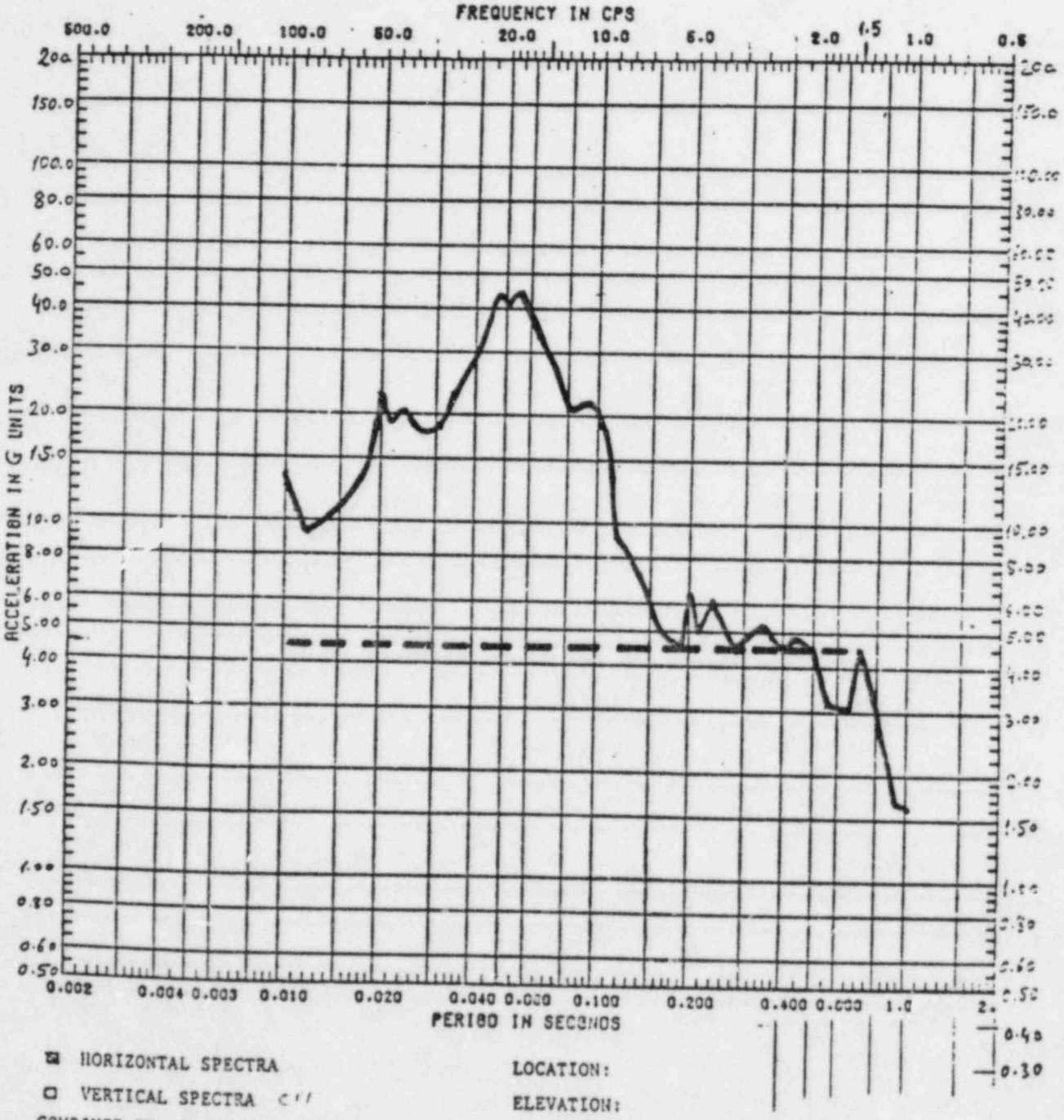


☒ HORIZONTAL SPECTRA

☐ VERTICAL SPECTRA

COMBINED BY ☐ ABS ☐ SRSS

LOCATION:

ELEVATION:

DAMPING:

Stresses at Critical Locations

Location	Stress (psi)	Allowable (psi)
Gasket retaining ring	17,146	19,400
Spacer ring	10,503	18,900
Valve body	16,793	29,100
Bonnet	21,624	29,100
Yoke clamp	9,256	25,350
Yoke clamp bolt	32,258	70,000
Yoke	8,703	19,400
Yoke/operator bolting	45,473	70,000
Stem	17,131	40,000
Disc	7,777	29,100

Other Evaluations at Critical Locations

Stem buckling load

F_{act} = 18,686 lb < F_{all} = 73,532 lb

Deflection

δ_{act} = 0.037 in. < δ_{all} = 0.062 in.

Valve Assembly Qualification Verification by Analysis

- Valve stresses demonstrated to be in elastic range
- Valve stem deflection demonstrated not to cause binding

Valve Assembly Qualification Verification by Testing

- Seismic testing representative valve assemblies
- In-situ testing of representative valve assemblies

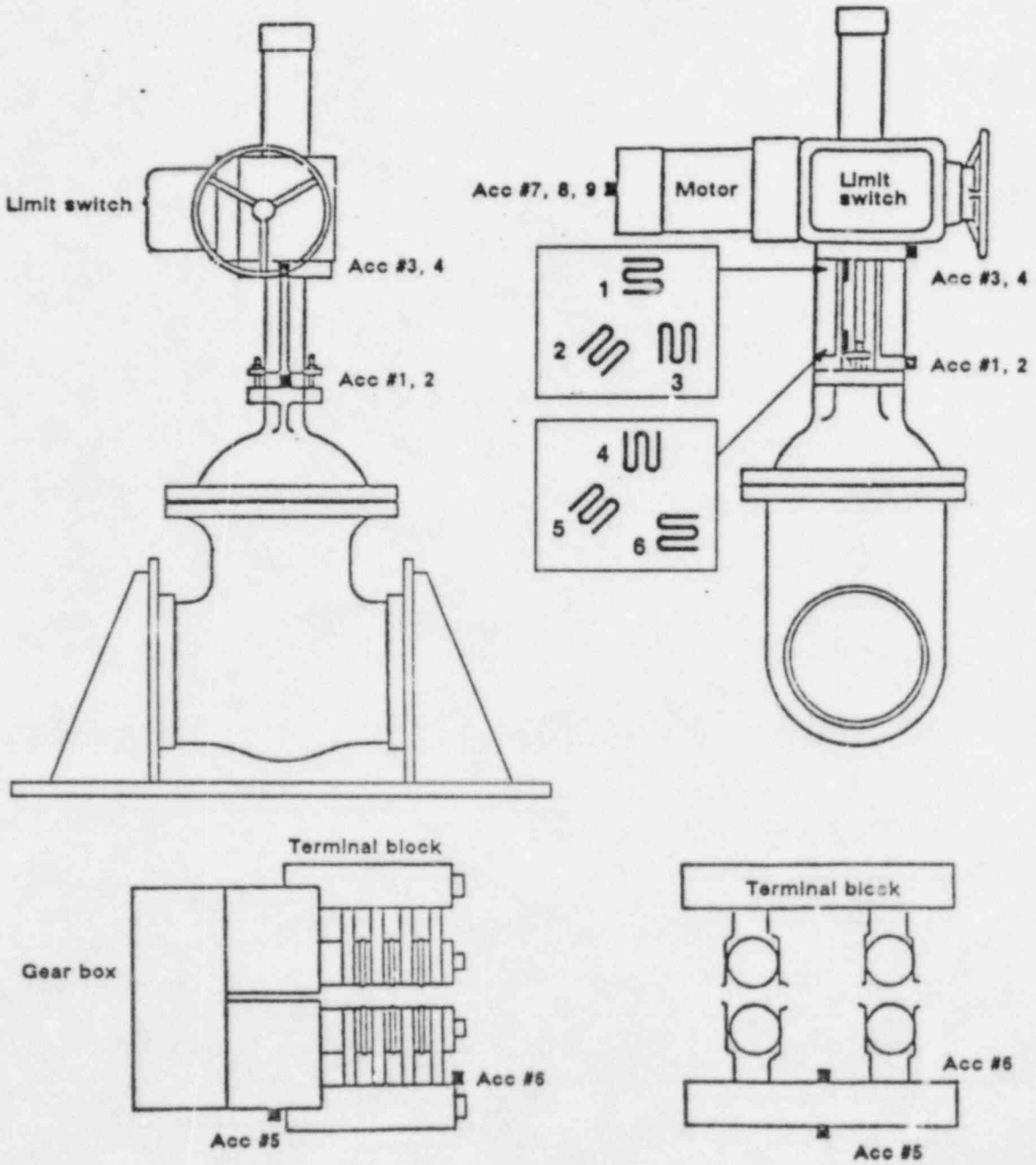
Analytical Models Substantiated by In-Situ Impedance Testing

Valve Description	Valve Manufacturer	Actuator Description	Fundamental Frequency	
			Analytical Results	Test Results
2-inch - 1500 # MO globe	Rockwell	Limitorque SMB-00	62.0 Hz	60.0 Hz
6-inch - 150 # MO gate	Powell	Limitorque SMB-000	50.9 Hz	54.3 Hz
14-inch - 150 # MO gate	Anchor/Darling	Limitorque SMB-00	32.0 Hz	30.7 Hz
16-inch - 150 # MO butterfly	Jamesbury	Limitorque H1BC/SMB-000	Rigid	Rigid
26-inch - MSIV	Rockwell	Ralph A. Hiller	16.7 Hz	17.5 Hz

Analysis vs. Test Comparison for Two Gate Valves

		16-inch Gate Valve		4-inch Gate Valve	
		Test	Analysis	Test	Analysis
Make		Anchor/Darling, 150 lb	Anchor/Darling, 300 lb	Powell, 300 lb	Powell, 300 lb
Operator		SMB-2-40 (660 lb)	SMB-0-15 (300 lb)	SMB-000	SMB-000
Accelerations	H_1	11.93 g	4.5 g	6.14 g	4.0 g
	H_2	12.26 g	4.5 g	6.09 g	4.0 g
	V	3.25 g	3.0 g	6.20 g	5.46 g
	$\vec{A}$	17.41 g	7.52 g	10.641 g	7.862 g
σ_{max} at the same location (yoke base)		3.01 ksi	3.17 ksi	6.13 ksi	11.14 ksi
Scaled down stress to analysis level		1.30 ksi	3.17 ksi	4.53 ksi	11.14 ksi
Margin = $\frac{S_{analysis}}{S_{test}}$		2.43		2.46	

16-Inch Valve Accelerometer and Strain Guage Locations



Conclusions

Analysis results concur with test results

- In-situ test results verify analytical capability to simulate dynamic characteristics
- Triaxial test results verify operability and provide assurance of conservatism for analysis method

Analysis results for 1E51-F063 are reliable for the purpose of operability verification

- IP wanted a clear understanding of what was expected for the November PVORT audit.
- IP wanted to receive staff confirmation that the approach for conducting the Pump and Valve Operability Program was acceptable.

At the end of the meeting the staff concluded:

- The staff had no major concerns related to the IP Pump and Valve Operability Program based on the information presented during the re-audit meeting.
- The staff will proceed with a re-audit of the IP PVORT. The week of November 18, 1985 for the audit was mutually agreed upon.
- All packages to be reviewed by the staff prior to the audit must be submitted to the staff by November 8, 1985.
- The responses to the 30 audit items from the initial audit should be submitted by November 4, 1985.
- The re-audit components would be selected from those remaining from the August audit plus ten new components which were provided to IP on October 25, 1985. In addition two "surprise" components will be given to IP a few days prior to the audit.

Original Signed by
B. Siegel, Project Manager
Licensing Branch No. 2
Division of Licensing

Enclosures:
As stated

cc: See next page

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